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Otto Peter Morgensen Jr.: The Cold War Aerospace Technology History Project (Interview 1)

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Otto Peter Morgensen

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Interview 1

Cold War Aerospace Technology History Project

Interview Conducted by Lynda Kachurek
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Video Interview 1
Video Tape 1

Time Log	Transcript
00:00:16	Lynda Kachurek: Today is Monday, March 6, 2006. We are talking today with Mr. Otto Peter Morgensen, Jr. This interview is being conducted in Studio A of the Center for Teaching and Learning at Wright State University, as part of the Cold War Aerospace Technology Archive project. The interviewer is Lynda Kachurek. Thank you so very much for talking with us today, Mr. Morgensen. It's a pleasure to have you here. I'd like to start by talking a little bit about your background if we could. Can you tell us when and where you were born please?
00:00:37	Otto Peter Morgensen: Yes, I was born in San Luis Obispo county in California. When? April 20, 1905.
00:00:49	Kachurek: Nineteen 0-five. So that makes you almost 101.
00:00:52	Morgensen: That's correct. [laughter]
00:00:55	Kachurek: Can you tell me a little bit about your parents, please?
00:00:59	Morgensen: My parents?
00:01:00	Kachurek: Your parents.
00:01:00	Morgensen: Yes. My father was an immigrant Dane from the island of Bornholm, which is an island out in the Baltic. My mother was a native of California. My maternal grandfather came in 1850 as a result of the gold rush. My mother was born in San Francisco in, oh I guess in the 1880s. So I'm a native Californian, a second-generation Californian. [laughs]
00:01:37	Kachurek: And what did your parents do?
00:01:39	Morgensen: My father was a farmer for most of his life and then he

was involved with operating some warehouses handling grain, largely wheat and barley, and shipping and handling it and marketing it for the farmers in that part of the country.

00:01:59 Kachurek: Did you have any brothers or sisters?

00:02:03 Morgensen: Yes, two brothers and four sisters. [laughs]

00:02:08 Kachurek: I'd like to talk a little bit about your schooling. Where did you go to school?

00:02:16 Morgensen: Well, I actually went to a one room country schoolhouse for my first eight years of schooling, and high school in the little town of Paso Robles. It was known as El Paso de Robles, meaning, el paso, the pass, de robles, of oaks--the pass of the oak trees. And later I went to the University of California at Berkeley. In fact, at that point in time there were only about two places in California to attend a university—the University of California at Berkeley and Stanford, down in Palo Alto.

00:03:04 Kachurek: While you were in high school, did you have any favorite subjects that you liked to study or things that you liked to do?

00:03:13 Morgensen: Yes, I think that I liked playing with radio the best. But we didn't have any well-written textbooks on radio. Later there was one, written by somebody at Stanford by the name of [Frederick E.] Terman, and that was the standard text for years. But I think I liked drawing, drafting, and radio probably better than anything else.

00:03:46 Kachurek: Did you have any particular favorite teachers or people that influenced you?

00:03:52 Morgensen: Yes, I surely had some favorites; how much they influenced me I do not know. We had one man from Boston. He talked with a Boston accent, and I thought that was very interesting. He was a very excellent teacher, too. I think he taught physics.

00:04:16 Kachurek: Now did you go directly from high school to college?

00:04:20 Morgensen: Yes. Oh, excuse me. No. I worked a year. I was largely self-supporting.

00:04:29 Kachurek: Did you always expect that you would go to college, or was it something that sort of came on you while you were working?

00:04:38 Morgensen: Well, I don't, I think it was a decision I made after I was through high school. The first aircraft to fly around the world, built

by Douglas in 1923, flew over my hometown, and I was amazed that these airplanes were going to fly all the way around the world. And I thought, well somehow I'll be associated with the designing and building of aircraft. And soon I realized that I needed more than a high-school education to be involved in something like that.

00:05:24 Kachurek: And that's when you decided to go back to school?

00:05:26 Morgensen: Yes, I decided that I needed to go to the university.

00:05:32 Kachurek: And how long were at the University of California?

00:05:36 Morgensen: Actually five years. I was there for four years, and then after Lindbergh's flight to Paris in 1927, everybody that owned a little factory or had flown during World War I wanted to build an airplane. And the demand for people who could design aircraft and have it approved by the old CAA--the forerunner of the FAA-- was in big demand so I stayed out until 1932. From 1928 until 1932, I was in the aircraft business. Then I went back from 1932 to 1933 and got my degree.

00:06:30 Kachurek: And in between there, you took some time to work in the aviation industry while you were going to school?

00:06:41 Morgensen: After my freshman year at the university, I wrote a letter to Donald Douglas and asked if I could have a summer job because that was the group that had built the first airplanes to fly around the world, the so-called Douglas World Cruisers. They were probably one of the most successful aircraft companies in the world. Douglas graciously said "Yes, come on down and we'll give you a job." So I went from Berkeley to Santa Monica where I worked during my summer vacation and then went back to school and did the same thing on two or three other occasions. So, I learned aircraft design and construction quite well. I had a job in the engineering department, and it was a rather fortunate circumstance because I was the lowest-paid man in the engineering department. There were only about eight or ten of us so I got to escort all the visiting dignitaries around the factory, and I met some people who are big names in aviation history today. I'm thinking in particular of a Frenchman, Charles Nungesser. He was one of the first people to fly and log ten thousand hours in the air. He was lost at sea in 1927 trying to fly from Paris to New York to win the so-called Orteg prize that Lindbergh later won. So, yes, I was busy in the aviation business during my college career.

00:08:59 Kachurek: You mentioned that you escorted several dignitaries or important people around Douglas?

00:09:03 Morgensen: Oh, yes. Besides Nungesser, let's see, we had Billy Mitchell, whom Mitchell Field in New York is named after. Our army

representative was Erik Nelson, one of first pilots to fly around the world. And others that I can't think of right at this moment.

00:09:31 Kachurek: What other kinds of things, other kinds of work did you do while you were working at Douglas?

00:09:35 Morgensen: I was largely a draftsman, probably not a very good one to start out with, because I handled drawing changes. If something didn't work, I'd make a change and go out to the factory and say, "Don't build it that way. Build it like this. Throw away what you've done already." And of course this action made the people involved very unhappy.

00:10:01 Kachurek: And what were the working conditions like? What was the Douglas production facility like, or area where you were working?

00:10:11 Morgensen: In the drafting department or in the factory?

00:10:15 Kachurek: Both, if you were out there?

00:10:18 Morgensen: Well, prior to Lindbergh's flight, and before aviation --commercial aviation-- expanded tremendously, everybody knew everybody else, and there was sort of a camaraderie among aircraft designers. We knew people on the east coast as well as everybody on the west coast. If we didn't know them personally, we knew what they were doing. [10 second gap in video/audio recording]

00:10:53 … There were only about eight men in the engineering department at Douglas when I first worked there, and there were three hundred or more when I left to come to Wright Field. So we lost all that camaraderie, where everybody knew everybody else. But the working condition was pleasant; everybody was happy to be doing what they were doing. And it was a lot of fun to design, draw up something, see it built and see it work. So we enjoyed our work very much.

00:11:33 Kachurek: When did you leave Douglas?

00:11:37 Morgensen: In 1936.

00:11:49 Kachurek: And you had mentioned in between that you worked for several different aviation companies?

00:11:53 Morgensen: Yes. When I got out of school in 1928, I had four years in the university and considerable experience in design of aircraft. I worked for a company in San Leandro, California, that's a little town just south of Oakland. I also went down to the San Joaquin Valley and helped design some aircraft for dusting crops and

spraying crops. I also worked on another small aircraft, in San Francisco, a little training airplane. Then the Great Depression came and there was no work. All the small companies failed, so in 1933 I went back to Douglas, and they made a job for me until I came here. I spent the fall of 1932 and the early part of 1933 back in Berkeley. But the Great Depression eliminated most of those small aircraft companies.

00:13:27 Kachurek: And when you left Douglas is when you came to Wright Field in 1936?

00:13:39 Morgensen: Yes, I came directly from Douglas to Wright Field.

00:13:44 Kachurek: Okay.

00:13:45 Morgensen: In 1936.

00:13:45 Kachurek: Why did you decide to make the move from California to Wright Field in Ohio?

00:13:51 Morgensen: Well, primarily salary. I think I was getting sixty-two and one-half cents an hour at Douglas and they offered me a dollar an hour to come to Wright Field so I took the dollar an hour. [laughter]

00:14:12 Kachurek: And where did you work when you first came to Wright Field?

00:14:15 Morgensen: Well, believe it or not, I expected to be somehow involved in structures, because that was my expertise at Douglas, but they assigned me to the old Equipment Laboratory. There was a lot of equipment that didn't work and they wanted somebody that had experience in industry to take action to assure those things would work. There was great emphasis on all-weather operations, cold weather, hot weather, dust, any and all environments.

00:14:58 Kachurek: So you were helping to develop items to assist in the all-weather flying?

00:15:04 Morgensen: Yes. To a large extent. Also, even some ground support equipment that didn't work.

00:15:12 Kachurek: Can you talk a little bit about what kinds of things you were working on?

00:15:20 Morgensen: Yes. Well, one of the things that involved all-weather operations was ice. They had old de-icer boots, inflatable tubes running from root to tip of the wings and tail surfaces that were inflatable. They would inflate periodically and remove ice from

the wings and tail surfaces. They were undesirable, because even though they removed the ice, they increased the drag of the wings and tail surfaces. For that reason, we developed thermal de-icing systems that used the heat in the exhaust gases to heat the surfaces and prevent ice from forming. That took a considerable effort and extended over a considerable period of time. We developed a system, and as I recall, that happened near the end of World War II. Not much of it saw actual service.

00:16:47 Kachurek: You came to Wright Field in 1936. What changes did you observe as World War II approached?

00:17:00 Morgensen: Tremendous increase in personnel. I think there were some twelve hundred people at the field when I arrived, and I forget the number during the war, but I think it was many thousands. I was moved from the Equipment Laboratory up to the Project Offices, where I sat during the war.

00:17:36 Kachurek: Did that change begin to take place before Pearl Harbor?

00:17:43 Morgensen: There was a gradual build-up before Pearl Harbor. They had built several buildings including Buildings 14 and 15, and I think Building 45. More people were being hired all the time. More young officers were being assigned to Wright Field, so there was a big build-up was in personnel.

00:18:25 Kachurek: That growth continued after Pearl Harbor as well?

00:18:29 Morgensen: Oh yes, oh yes. In fact it accelerated. It was a slow build-up, but after Pearl Harbor it accelerated.

00:18:44 Kachurek: Did the type of projects that you were working on change after Pearl Harbor and the U.S. entrance to the war?

00:18:56 Morgensen: I don't think so. I think the work that we were doing just continued, much as before. We solved problems that had to be solved, and we were one by one affecting some kind of a solution to all the problems.

00:19:18 Kachurek: In addition to the de-icing and some of the all-weather projects, can you talk about some of the other projects that you were involved with during this time?

00:19:30 Morgensen: Yes. There was a lot of ground-support equipment, even things that seemed very simple, like jacks for supporting the aircraft when the landing gear retraction systems were checked.

Things like that weren't working well and new designs were needed. I can't think of all the little items, but there were a number of them.

00:20:08 Kachurek: Okay.

00:20:08 Morgensen: Heaters. Aircraft heaters was a big one. The heaters never worked. The thing that worked was dangerous. It was merely a tube running down the exhaust pipes on the engines, and the ambient air flowing down the tube was heated and allowed to flow into the cockpits, which was all right. But the tube with the so-called clean air would fail and exhaust gases would get into the cockpit. There were at least three accidents attributed to just that and pilots were killed. So we couldn't use that system anymore.
We really never had a good aircraft heater until the jet engines came into being and we used bleed air from the turbines to operate very effective environmental control systems. We then had good aircraft heaters.

00:21:28 Kachurek: Were you working only with aircraft, or did you also do any work with helicopters or any other type of equipment?

00:21:37 Morgensen: Yes, when I moved up in the project office I was responsible for helicopters and experimental trainers and transports, stuff like that. And, the first helicopter caused much excitement when it arrived at Wright Field. Igor Sikorsky came out, and we all had a lovely time with him. He was a delightful person. We had never seen an aircraft stand still in the air before and that caused much excitement. It was a lot of fun.

00:22:28 Kachurek: I bet, I bet, yes. And you mentioned that you moved up to the project office-

00:22:35 Morgensen: Yes.

00:22:35 Kachurek: -during the war?

00:22:35 Morgensen: Yes.

00:22:35 Kachurek: Did you serve as a project manager?

00:22:38 Morgensen: Yes, I think that was my title. I forget the title, but I was kind of the focal point, the interface between the contractor and all the laboratories at the field and the using command.

00:23:02 Kachurek: And you were assigned then to a specific plane as a project, or a specific system as a project?

00:23:12 Morgensen: Usually it was a complete aircraft at that point in time.

00:23:47 Kachurek: What was the greatest challenge for you as a project manager?

00:24:06 Morgensen: I really don't know. It didn't seem like there was any really great challenge. It was to assure that the design and production of the experimental aircraft was approved by the laboratories, and any suggestions they had were transmitted to the contractor. But I didn't feel it was a great challenge, not nearly as much as early in my career where I was responsible for the design of a whole aircraft. So, just another job, that's all it was.

00:25:12 Kachurek: Did you stay at Wright Field through the end of World War II?

00:25:17 Morgensen: Just at the end I went out for most of a year in the industry, but I decided I liked Wright Field much better. I liked Dayton, Ohio, much better than where I was working.

00:25:33 Kachurek: And, so you came back to Wright Field, then, right after World War II?

00:25:39 Morgensen: Yes. And stayed until I retired in 1970.

00:25:47 Kachurek: When you came back to Wright Field, did you go back to the same job that you had had previously?

00:25:54 Morgensen: No, I went back to the old equipment laboratory, as a consultant to the laboratory chief. There were four of us in those positions. We were consultants to the chief, and among other things, I supervised the efforts of some German scientists that we acquired as part of what was called *Project Paperclip*. And that was an interesting assignment, too, because we had some very unusual projects to work on.

00:26:42 Kachurek: And while you were supervising the scientists, how many would you say you were working with on *Project Paperclip*?

00:26:50 Morgensen: I think it was four.

00:26:53 Kachurek: It was four?

00:26:53 Morgensen: Yes.

00:26:56 Kachurek: What kinds of projects were you working on?

00:26:59 Morgensen: Well, one of the things we investigated was the application of the so-called Hilsch tube. It was a very clever system that a German professor by that name invented to liquefy air. We wanted to understand how it worked and see if it had any application to aircraft. Well, we found out how it worked. We understood the thermodynamics of the thing, but we never found an adequate

application for cooling aircraft equipment. And one of the other things that we investigated was spray equipment for dispensing DDT. That was a real technical challenge, too. Those are the two most difficult ones that I can think of.

00:28:11 Kachurek: Working with the DDT experiment, was that because you had experience with the crop-dusting equipment from earlier in your career?

00:28:19 Morgensen: Yes, but it was somewhat advanced. We had to work with the Department of Agriculture to determine how much DDT per square foot should be dispensed in order to kill certain insects or deforest certain plants. We also had to determine the optimum size of droplets to spray. All of that required some rather advanced engineering.

00:29:18 Kachurek: How long did you stay with the Equipment Lab? Were you there a number of years when you came back?

00:29:27 Morgensen: I think only a couple of years, and then they started the Aeronautical Research Laboratory and I was transferred there.

00:29:46 Kachurek: Okay.

00:29:46 Morgensen: And I stayed there for about four or five years.

00:29:52 Kachurek: What kinds of projects did you work on with the Aeronautical Research Lab?

00:29:56 Morgensen: Well, I had the title Chief, Plans and Programs, and I did a lot of paperwork, but I also pursued a project having to do with the cooling of aircraft rotary equipment, like motors and generators. I worked with Ohio State on that project.

00:30:40 Kachurek: How long were you with the Aeronautical Research Lab?

00:30:42 Morgensen: Until 1955. I would say about five years, and then I went to the KC-135 System Program Office.

00:31:00 Kachurek: And what was your position in the KC-135 office?

00:31:06 Morgensen: I was assistant to the chief of the engineering side of the Joint Program Office.

00:31:37 Kachurek: And did your work involve a lot of design work or was it more paperwork?

00:31:45 Morgensen: More paperwork.

00:31:43 Kachurek: More paperwork.

00:31:49 Morgensen: Yes. Very little design on my part.

00:31:53 Kachurek: As your role then as assistant to the chief, were you working with the information between the chief and the project?

00:32:09 Morgensen: Yes. Well, primarily we monitored the design of the aircraft and assured ourselves that the design was approved by our laboratories. So we were the coordinating arm of the program.

00:32:40 Kachurek: How long did you stay with the KC-135 project?

00:32:52 Morgensen: I guess about five years, and then they closed out the so-called program office. Then many of us went to the C-141 systems program office.

00:33:16 Kachurek: What were the conditions like? What was your office or your building like?

00:33:26 Morgensen: Well, in the KC-135, we were in old building 16, I guess. And when we were in the C-141, we were in building 45. And, we had good offices, convenient.

00:33:50 Kachurek: Did you get to go out into the different laboratories a lot, or were you mostly in your office?

00:34:00 Morgensen: Yes, we tried to have a rapport, a close working relationship with all our support in the laboratories. We tried to know everybody that was involved.

00:34:14 Kachurek: As you were working in these different offices, how did you continue your training and your education? Were you able to take classes, or was it through talking with your colleagues?

00:34:36 Morgensen: Well, there were scientific advancements occurring many places, the old NACA, industry, primarily. And maybe once in a while something at the field. And of course, the contractors had good people. They were inventing or devising new equipment all the time.

00:35:18 Kachurek: Did you get a chance to go visit the contractors while the project was going on?

00:35:23 Morgensen: Yes, we visited them as necessary, but travel funds were always somewhat in short supply, so we didn't travel unless it was necessary. But we did. We had to visit the contractors from time to time. And so did our people. They wanted to see first hand what was going on.

00:35:56 Kachurek: Were most of the people that you were working with civilians or military, or a combination of the two?

00:36:03 Morgensen: It was a combination. I think it was more civilian than military in the program offices. Yes, it was generally more civilian than military. But usually the chiefs, the key positions, were all military.

00:36:32 Kachurek: Well, after you were working on the C-141, how long were you with that particular project?

00:36:40 Morgensen: Let's see. I think I left during the middle 1960s.

00:37:11 Kachurek: And, on the C-141 project, were your responsibilities the same as when you were working on the KC-135 or did they change?

00:37:19 Morgensen: It was a little different. I had a little office of four people, and I forget my title, but we were generally responsible for the cargo loading and handling, and maintainability, reliability, and things of that nature.

00:38:04 Kachurek: And were you able to stay with the C-141 project until its completion, or did you leave?

00:38:13 Morgensen: No. They had a reshuffling of personnel, and I wound up with being responsible for the X-24A, a lifting body aircraft. That was an interesting program, too, because we weren't exactly sure how you could fly something without wings and still control it. That was an aircraft built by Glenn L. Martin, and it was being tested out at Edwards Air Force Base.

00:39:01 Kachurek: With the X-24A program, you worked again out of the program office?

00:39:08 Morgensen: Yes. We had a program office, and that organization was somewhat different. There were several projects handled out of one office, and I think the X-15 was one as well as the X-24A and some other experimental programs.

00:39:38 Kachurek: So they didn't let you out of doing the paperwork?

00:39:42 Morgensen: No, I still shuffled paper. [laughter]

00:39:45 Kachurek: With each of these changes, between the KC-135, the C-141, and the X-24A program, did you work with many of the same people? Or did the people that you were working with change a lot between the different programs?

00:40:10 Morgensen: I think they changed it quite a bit. They did about the same type of thing, but there were different people involved, and more of them.

00:40:29 Kachurek: What part would you say you enjoyed working on the most? What was your favorite, or did you have a particular fondness for a project?

00:40:44 Morgensen: Well, except my first days in the old Equipment Laboratory, I think I liked the KC-135 project the best. It was the thing that made range extension of the B-52s possible. With the KC-135 tanker and its refueling system, the B-52s could strike any target on the face of the earth, and I liked being involved with something like that.

00:41:25 Kachurek: Which one gave you the biggest headache, do you think? What part of the job did you not like?

00:41:38 Morgensen: I think the Aeronautical Research Lab, because the personnel were involved with professors doing research. I didn't see any application for most of it. I wanted to see better airplanes, built cheaper, more reliable, things like that, and I wasn't seeing that in the Research business. I saw professors working on their hobbies and things they were interested in and not particularly caring who used it for what. So I wasn't particularly happy with that assignment.

00:42:24 Kachurek: Where were you living while you were working at Wright Field?

00:42:39 Morgensen: Well, for most of the time, I lived over back of the Art Institute. Let's see, I got married in 1950, and then we lived in Patterson Park, that's Shroyer and Patterson Roads. And then moved to Kettering near Alter High School.

00:43:19 Kachurek: Would you like to take a break for a few minutes, get a drink of water?

00:43:19 Morgensen: No, I'm doing all right.

00:43:26 Kachurek: You're doing all right. Are you sure? We can take a break for a minute.

00:43:26 Morgensen: No, I'm doing all right. If you feel like a break, it's quite all right.

00:43:31 Kachurek: [laughs] I'm okay, I'm okay. We just wanted to make sure you didn't want a drink of water or something.

00:43:39 Morgensen: Not a thing. I'm perfectly comfortable.

00:43:43 Kachurek: You're perfectly comfortable. Good! Good. When you were working on any of these projects, and just pick whatever comes to mind, did you have days that were very typical or did they change a lot from day to day?

00:44:07 Morgensen: The kind of work?

00:44:08 Kachurek: The kind of work that you were doing.

00:44:12 Morgensen: I think they were rather routine. I didn't see anything where there was a big change. I was working with the contractors and working with the laboratories and being sure our best technical people approved what was going on at the contractor's plant. And if the contractors were not happy, try to resolve whatever was making them unhappy.

00:44:53 Kachurek: During your years at Wright Field, the laboratories and the offices went through several reorganizations—

00:45:01 Morgensen: Yes.

00:45:02 Kachurek: -how did that affect the work that you were doing?

00:45:08 Morgensen: Well, surely it made a better program, very much better. Because, for instance, in the C-141, all the institutions that were any way involved with that program had a representative in the System Program Office, referred to as a SPO. In the SPO, everybody was there, and everybody knew from day to day what was happening, and if something was happening that they didn't like, they could initiate some action to get it changed. And I thought that was a tremendous improvement. For instance, the C-141 had to do many things—handling palletized cargo, haul personnel, provide facilities for paratroopers, aerial delivery of cargo—all those things, and everything had to work and work well. So, that was nice, to see that everything was resolved.

00:46:27 Kachurek: Also during your years there, the budget for research and development changed dramatically several times. Did your work and did your projects feel the effects of that? Those budget changes over the years?

00:46:47 Morgensen: I think we had adequate funds, and that's where the System Program Offices, SPO, was very effective. One of the first things they did was to prepare something called a Program Development Plan, and it spelled out precisely what organizations were going to do what, when they were going to do it, and how much it was going to cost. It identified additional personnel, additional facilities, and extra ramp space in hangers. Everything that was involved with the program was spelled out, and a cost-estimate was provided. When a program was approved, the cost-estimate was automatically approved, and so it just made a better program. And I never personally worried about the budget. In return for that, the SPO was expected to deliver so many aircraft to the using command in accordance with an approved schedule.

00:48:55 Kachurek: During your years at Wright Field, you were there for the start of World War II, the end of World War II, Korea, and through the start of the Vietnam conflict—

00:49:09 Morgensen: Yes.

00:49:10 Kachurek: -what do you think were the most significant contributions that Wright Field produced during the years that you were there?

00:49:27 Morgensen: Well, I think the most significant development was the B-52/KC-135 system. Here we had a bomber with its tanker that could deliver an A-bomb to practically any target on earth. And we could do it with considerable reliability. I think that was by far the most important program that I was concerned with. There were many developments. The jet engines came along and eliminated very unreliable power plants like those that existed when I arrived at the field in 1936. Those were the engines we used on the KC-135 and on the B-52. And I thought that was important. Of course, we had missiles coming along at that time, too, and we had missiles in silos with hardened sites, but we didn't have anything like our KC-135/B-52 combination, and the Strategic Air Command.

00:51:17 Kachurek: We're going to take just a little break to change a tape.

00:51:24 Morgensen: Good, good.

00:51:25 Kachurek: Can we get you a drink of water?
End of Video Tape 1.

Start of Video Tape 2.
00:00:07 Kachurek: We were talking about the contributions of Wright Field, and you were talking about the B-52 and the KC-135 program. You also mentioned the Strategic Air Command, and we kind of caught you in the middle of your statement. You mentioned that the B-52 and the KC-135 programs were some of the most significant managed by personnel at Wright Field. Were there other projects or types of technology that you would consider important that came out of Wright Field?

00:00:55 Morgensen: There may well have been, but I didn't know about them. In the Electronics Laboratory, for instance, with radar and some related things, some very significant things were happening. But I wasn't knowledgeable about them. So there may well have been. Reconnaissance changed. When I came to the field, all we knew was photography, aerial photography, but when radar came along, there were new possibilities. They were probably being exploited, but I wasn't knowledgeable about them.

00:01:49 Kachurek: And you mentioned that you retired from Wright Field in 1970, is that correct?

00:01:55 Morgensen: Yes.

00:01:56 Kachurek: Was there a particular reason that you chose to

retire then?

00:02:00 Morgensen: Yes, I was getting old. [laughter] And they had just initiated a cost of living increase. In other words, they increased our retirement to provide for cost of living increases due to inflation. That was another incentive. But I thought that some 34 years was enough.

00:02:45 Kachurek: What would you say the biggest change at Wright Field was during your career there?

00:02:54 Morgensen: The biggest change I saw happening at the field was the reduction in what I would call in-house work—design, testing, things of that nature. Now, most everything is being done by the contractor. The people at the field supervise it, but they aren't day-to-day involved with it to the extent that they were when I came to the field. Then you actually had drafting rooms and machine shops. We designed things, and we built things, and we tested things, and we were very knowledgeable about the details. As the field became bigger and bigger, people became more "paper-shufflers." That's the biggest change that occurred, the reduction of in-house design and development. I could also add testing. We once conducted extensive tests. That all disappeared when it was relegated to the contractor.

00:04:30 Kachurek: Why do you think that change happened?

00:04:39 Morgensen: Well, maybe the development work got too big, maybe politics was involved. I don't know. A combination of both, maybe, I don't know.

00:04:55 Kachurek: Along the years of your work, looking back over from your first job with Donald Douglas through your retirement at Wright-Patterson, did you develop any items that you got patents for, during that time?

00:05:19 Morgensen: Yes, I had a half-dozen or more patents. And usually they were assigned to the government. But any commercial application could be exploited. The items that I patented in industry were assigned to my employer, like when I built aircraft for dusting crops. I also developed some spraying equipment which was patented and sold to the company that I was working for. And they were entitled to it because they were paying my salary, and that's what I was expected to do. And, of course, it was the same with the government. I was supposed to be doing my job. If a patentable item was created, they patented it. They surely have a right to ownership.

00:06:48 Kachurek: Can you tell us what some of your other patents were for, in addition to the spray equipment?

00:06:51 Morgensen: Well, I think the one that earned the most money was an airplane jack. Somebody thought they could sell it in large quantities. I don't know whether they ever did or not. But they gave me ten thousand dollars for it, the first ten thousand dollars I ever saw at one time. [laughter]

00:07:18 Kachurek: What was the patent process like for you?

00:07:24 Morgensen: The field had a patent office, and I worked with them and explained what I created. They made the drawings as required by the patent office. I worked with them and explained what it was and how it worked. An item, to be patentable, must possess three things—it has to be new, it has to be novel, and it has to be useful. It has to have those three things, and then the device is patentable. And the patent is on a device or an article, it's not on an idea. A lot of people think that "Oh, I've got a great idea and it should be patentable." It isn't. It's on a device that has those qualities—new, novel, and useful. And that's what is done when things are designed.

00:08:44 Kachurek: So the patent office would prepare the drawings as required. Would they finish the paperwork, or were you involved throughout the process?

00:08:54 Morgensen: They did practically all the paperwork. But I worked with them to assure that their paperwork was adequate. And what I was doing in the Equipment Laboratory was being done by others. They all had patents of one kind or another. Some of them are, I'm sure, very important.

00:09:42 Kachurek: Looking again at your career as a whole, how has the direction of your work changed, from when you first went to work for Donald Douglas to when you left Wright Field? What kinds of new directions did it take you?

00:10:06 Morgensen: Well, it went from designing, doing original work, to what they choose to call 'management' at the field. I'm not sure I ever fully understood that term, and I don't think that I was particularly well-suited to be a manager. I think I liked my slide-rule and a T-square better than I did supervising people. So that's how it changed for me. And I think that's another reason I retired when I did. Of course I was old enough, but I could have worked another five years, I guess. But I was sixty-five years old, and I thought that was a good time to bow out.

00:11:06 Kachurek: As you moved into the management side of things did they offer any education opportunities or training to assist you in making that adjustment?

00:11:18 Morgensen: Yes, they did. I took some courses on my own. When the jet engines came along, I wanted to know more about them, so I took a course at the University of Dayton. I also took a course in theoretical physics from Ohio State. But, yes, they offered some courses.

00:11:59 Kachurek: Did you belong to any professional societies?

00:12:08 Morgensen: I don't think so. I don't think I was much of a "joiner-upper." I liked to be an individual rather than be part of any kind of a group.

00:12:33 Kachurek: What was your last day at Wright Field like?

00:12:38 Morgensen: Oh, a big party. [laughter] Yes, they had a big party, to say farewell. That was about it. I think it was held over at the Officer's Club. It was very nice. All my old friends were there. Maybe they were glad to get rid of me. [laughs] I know the younger people coming along were.

00:13:15 Kachurek: As you were working over the course of your career at Wright Field, what kinds of records or documents would you create as part of your work?

00:13:33 Morgensen: Well, I'd write specifications. Once in a while, I would write what's called a technical order. For instance, I had to write one to tell pilots how to avoid icing conditions. I would prepare things of that nature, largely specifications, stating here's what it is, here's what it does, here's how it does it, and here's the test we will make to prove it will do all those things under the specified environmental conditions. So, I guess that's what we would call a specification.

00:14:55 Kachurek: Would there also be written documentation about things that didn't work, or items that failed a test along the way?

00:15:06 Morgensen: Well, we had what I thought was a very good system, and it existed for years, and that was a thing called the Unsatisfactory Report. The using command was required to submit an Unsatisfactory Report on equipment or items that didn't work. And it came back to Wright Field to the very person who wrote the specification or made the drawing or caused the thing to be built in the first place. And he was required to make changes to the maintenance inspection and repair, or changes to the design, changes to the qualification tests, et cetera, to assure that the thing would function as it was supposed to. And I thought that was a good idea. But somehow the responsibility for resolving an unsatisfactory performance was removed from Wright Field and given to the depots. And I never liked that, because I thought that the person who was responsible for creating the device should be held responsible for making it function properly. And I thought it educated him, and he'd become a better engineer because he would learn from his mistakes. So I never liked the fact it was removed from Wright Field.

00:17:31 Kachurek: Were you involved a lot in the testing of the different items and projects, or was it mostly the reports about the testing that you saw?

00:17:41 Morgensen: I was involved to a considerable extent with the testing of stuff that I created at the field. And that educated me, too. Yes, I was involved to a considerable extent.

00:18:19 Kachurek: To change topics just a little bit, you retired in 1970-

00:18:30 Morgensen: Yes.

00:18:30 Kachurek: -can you tell us what kinds of things have kept you occupied since your retirement?

00:18:37 Morgensen: Well, I paint pictures now. [laughs] And I go to art school. The professor tells me where my pictures are no good, where they can be improved, things of that nature. [laughs] But, I haven't been involved in golf or anything athletic. I should probably be getting more exercise. But, I've still been retired for thirty-five years. I'll be 101 in a month and a half, so whatever I'm doing must be working! [laughs]

00:19:25 Kachurek: How long have you been painting pictures?

00:19:27 Morgensen: Twenty-five years. [laughs] Once in a while, something turns out pretty good. I don't think I've given Dawne one yet. [laughs]

00:19:46 Kachurek: Now, in other conversations with you, I know that you're a computer user. What are your thoughts on technology in the twenty-first century?

00:20:04 Morgensen: Well, I think it's fantastic. And I think that the computer is the greatest thing that ever came along. And I wished I'd kept active and knew more with it. I was involved at the start. I worked with Von Neumann at Princeton, E.P. Little at Harvard, J.R. Ragazzini at Columbia and IBM, at the very start of the thing. And then I became involved with other things and had no more contact with those people or what they were doing.

00:20:45 Kachurek: What years were you working on that?

00:20:54 Morgensen: Yeah, I would say 1951, 1952 or 1953, or along there.

00:21:02 Kachurek: Okay. So it was involved in a project at Wright Field?

00:21:08 Morgensen: Yes. We were starting a computer laboratory. We had whole air-conditioned warehouses at Wright Field to do what a little thing that you can put in a corner of the room will do now. So, the improvements or the development of the computers has been fantastic. The computer chip has made all the difference in the world. So that's one of the biggest things that's happened. And I remember dear old Dr. Draper at MIT was worried after World War II that so many young people were returning to the universities and writing theses by the hundreds that an important one would come along and it would be overlooked. And he was very much concerned about the storage and retrieval of information; the computers solved all that. Press the button and you get Google or Yahoo. Type in something, there's your answer. [laughs] Incredible.

00:22:46 Kachurek: When you were working with the computer lab at Wright Field, how did you get involved with that?

00:22:54 Morgensen: Well, it was recognized early that we needed computers, but I wasn't really involved with the computer lab. When I was in the Aeronautical Research Lab, the computer lab had a chief. I was only involved in a sort of a peripheral way. I wasn't familiar with the details. We had two types of computers—digital and analog, and a lot of our work was with the analog computer. We could simulate a lot of dynamic situations, with the analog computers--probably more conveniently than we could with our digital computers at the time. But I don't think that's true now. I don't know what's going on. It's completely beyond me. [chuckles]

00:24:08 Kachurek: Throughout your career at Wright Field, so essentially between 1936 and 1970 and throughout your retirement, you've lived in and around the Dayton area. Can you talk a little bit about what Dayton was like when you first got here?

00:24:27 Morgensen: Yes. The biggest change that I can think of is the transportation system. A little railroad ran from Cincinnati to Columbus, and a lot of us rode on it to Wright Field. It ran right in front of Wright Field, and a lot of us rode from downtown Dayton to work on that it. It came right up Main Street in Dayton, turned down Third Street, out Third Street to Wright Field and stopped at the front gate. Well, that changed, and then there was the bus system. I don't know how people get to work now unless they drive their own automobiles. It seems that the transportation system changed considerably.

And then, of course, Dayton became very much larger. Kettering didn't exist, I don't think, and Oakwood grew. Everything grew, and it became a bigger city, very much bigger city. Shopping centers were built all over, like the new building that we drove by coming out here. A bigger city and the changed transportation system, that's the biggest changes I see.

00:26:13 Kachurek: During the 1930s, 1940s, and 1950s, when you weren't at Wright Field working, what kinds of things would you do for fun? What would you do for relaxation or enjoyment outside of work?

00:26:30 Morgensen: Well, I played a little tennis for exercise. I liked to go over to the West Side in the Hungarian community and listen to gypsies play their violins. I loved that because it was a little bit like what I was used to when I came here from the Los Angeles area. There, we had all kinds of entertainment. We had Mexican, we had German, we had Hungarian, we had Russian, we had Italian. We had all kinds of entertainment and all kinds of food. And rather than just standard American brand, I liked to listen to the gypsies play their violins. And they were always nice to me over there. In fact, I went to a Hungarian dinner just yesterday. [laughter]

00:27:36 Kachurek: Did you have a favorite restaurant that you would go to a lot?

00:27:41 Morgensen: I think so. For food, I think that old Culps Cafeteria was the best food. It was downtown in the Arcade, between Third and Fourth Streets, and between Main and Ludlow. They had excellent food. But for restaurants, I guess my favorite was the old King Cole-- I think it was first known as the Seville. But Culps seemed very expensive. That cost all of seventy-five cents to eat dinner there. [laughter] Because at that time you could eat breakfast at the old Virginia Cafeteria for twenty-five cents. You got ham and eggs, toast, and coffee for twenty-five cents. So seventy-five cents for dinner seemed like an awful lot of money. [laughter]

00:28:56 Kachurek: Would you go to any shows or movies as part of your evening or weekend activities?

00:29:05 Morgensen: Well, I never was too crazy about moving pictures or drama generally, because I spent too much time around it in Southern California. There was too much of it going on. I didn't have too much enthusiasm for it. But I loved to hear the gypsies play their fiddles, and I think that was my favorite entertainment.

00:29:38 Kachurek: Okay.

00:29:40 Morgensen: Gosh, I almost became a gypsy myself. [laughter] One of them gave me his vest and his violin. I still have it.

00:29:51 Kachurek: And you also play the violin as well. Correct?

00:29:54 Morgensen: Hardly! I can't even play it well enough to suit myself. [laughter]

00:30:18 Kachurek: If you were talking to somebody who was writing a history of Wright Field, how would you talk about, or what would you say about its significance to the Dayton area as well as to the larger United States, in terms of its history?

00:30:47 Morgensen: In the beginning, it was tremendously important. Those of us who worked in industry earned a living by using publications produced here in Dayton, Ohio. The first usable text in aerodynamics was written at old McCook Field, or the early days of Wright Field. It may have been the early days of Wright Field. Charles, I think N., Monteith, *Simple Aerodynamics and the Airplane*, was the textbook. You could use it for computing aircraft performance. And for the structures, when aircraft had welded steel fuselages, spruce wing beams and ribs, the textbook for all that was written at the field by Alfred Niles and titled *Airplane Design*. Those were the textbooks we used to design aircraft.

Personnel at McCook and Wright Fields also issued aircraft information circulars that addressed real problems with aircraft design and published them periodically. For fifteen or twenty cents, you could order them from the Government Printing Office. We lived off them. That's how we made our living. We had a little library of those things. Everybody had the two textbooks that I

mentioned, and everybody had the latest Air Corps information circulars. And, so Dayton was very important.

And then Jimmy Doolittle and others did some flight testing. Doolittle was the first one to make an outside loop. He was later famous for the Tokyo raid during World War II. As time went on, more and more testing was done at the contractor's plant. And almost all the flight testing was done at Edwards Air Force Base. So the testing moved from Dayton to industry and Edwards Air Force Base. Powerplants were being tested at Wright Field when I came, but after World War II, a facility was built at Tullahoma, Tennessee, and all the engine testing was moved down there. And we once did structural testing. In early days, we always procured a static test article which was tested at Wright Field. I think that's all moved to industry, i.e., the contractor's plant. Maybe supervised by people at the field, but I'm not sure how much supervision they exercise. But those are some of the things that were once exceedingly important at Wright Field and old McCook Field. But as research and development grew and grew, more and more activity was delegated to contractors and other bases. And I think that's what occurred. But Dayton, Ohio, that's where it started.

00:35:34 Kachurek: What would you describe as the most significant technology to come out of Wright Field?

00:35:52 Morgensen: Well, I'm not sure. Aeromedical, excuse me, aeromedicine started here. The Aeromedical Laboratory, headed by Captain Dr. Harry Armstrong, may have been some of the most important. There was also some good work done in radar, radio, and structural criteria, which may have been very, very important. So I'm not sure which was the most important, but some very important things were developed at Wright Field.

00:36:43 Kachurek: Did you know Harry Armstrong?

00:36:45 Morgensen: Did I know him? Yes, very personally. Yes. And I knew his assistant, Dr. Heim. They did some very good work, and their activities grew and grew and grew. Finally, the Aeromedical Laboratory was established. Moreover, I think there's an institution down in Texas named for Dr. Harry G. Armstrong, an excellent man. Goats were tested on a centrifuge, and much high-altitude testing was done with people. That may have been some of the most important work that was done here. Most of our wind tunnel work was done over at Langley Field, Virginia, with the old NACA. We had wind tunnels at the field, but most of the wind tunnel work was done over at Langley Field.

00:38:21 Kachurek: We're going to get ready to wrap this up for today-

00:38:24 Morgensen: Thank you.

00:38:25 Kachurek: -but knowing that we're going to talk to you again-

00:38:28 Morgensen: Yes.

00:38:29 Kachurek: -is there anything that we haven't covered? What we've tried to do today is look very broadly at your career. Is there anything that we've missed talking about today that you'd like to talk about when we get together again?

00:38:50 Morgensen: I'll think about it.

00:38:51 Kachurek: You'll think about it and let me know.

00:38:54 Morgensen: Yes. I think Dayton, Ohio, is surely where it started. Surely, aviation medicine started here. So this is a focal point for aviation. Here and Langley Field were the places we looked to when I was sitting out on the West Coast, running my slide rule and running my T-square up and down on a drawing board.

As aviation became more and more a part of our life, more and more a part of warfare, and the whole business got bigger and bigger, it was natural that it couldn't all be handled here, and other institutions would be required to do their part, which they did all over the country. So maybe that's what occurred, maybe that's what had to occur. Surely the establishment of Edwards Air Force Base was a very significant idea, because they had thousands of acres of land level enough to land on if they overshot their main runway. And with more and more sophisticated aircraft being developed, that was the place to test them. So, it's all very interesting, and I had a very interesting career. I'm not sorry for anything. Maybe that's why I'm living so long. [laughter]

00:41:02 Kachurek: That could be, indeed. [laughter]

00:41:09 Morgensen: Well, I had a lot of fun.

00:41:10 Kachurek: Oh, that's the most important part. Well, I think we'll go ahead and end for today, and we'll count on talking with you again-

00:41:16 Morgensen: That's good. Well, thank you, Lynda.

00:41:18 Kachurek: -and thank you very much for your time.

00:41:21 Morgensen: Sure, been a lot of fun. Now, I won't ruin your microphone again. I guess you'd better unhook me.

End of Tape 2.
End of Video Interview 1.